

**REMARKS**

Upon entry of the present amendment, claims 1,5, 7-9, 13, 17, 19 and 22 will be amended, so that claims 1-22 will remain pending with claims 1 and 8 being independent claims.

By the amendment herein, the claims have been amended to even more explicitly recite the claimed subject matter as will be further discussed below as well as to include language preferred by the Examiner.

Reconsideration of the rejections of record, and allowance of the application in view of the following remarks are respectfully requested.

**Statement of Telephone Interview**

Applicants express appreciation for the courtesies extended by Examiner Berman to Applicants' representative Arnold Turk during a November 25, 2009 telephone interview.

During the interview, the crossing through of Drobny was discussed. The Examiner was reminded that Drobny is cited by an Examiner in Application No. 10/577,619 (which is used in an obviousness-type double patenting rejection in the instant application). The Examiner indicated that she will review Drobny in '619 application, and it was not necessary to submit a copy in the present application. It was also noted that while the Examiner cites pages 8-9 and 60-63 of Drobny, only page 8-9 are available to Applicants in the Image File Wrapper of the '619 application.

Regarding the 35 U.S.C. 112, second paragraph, rejection, amendments to the claims were discussed, with suggestions being made by the Examiner. The amendments and arguments submitted in the present response are in accordance with the Examiner's suggestions, including arguments as to the understanding of one having ordinary skill in the art with respect to

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radiation-chemically modified polytetrafluoroethylene powder and plasma-chemically modified polytetrafluoroethylene powder.

Regarding the prior art rejections, the Examiner suggested that claim 1 be amended to be in product by process form. The Examiner also indicated that the prior art rejections will be reconsidered upon submission of a written response.

### **Information Disclosure Statement**

Applicants express appreciation for the Examiner's confirmation of consideration of Applicants' Supplemental Information Disclosure Statement and Second Supplemental Information Disclosure Statement by including initialed copies the Forms PTO-1449 submitted therewith with the Office Action.

However, the Examiner has crossed through Drobny, because a copy has not been provided. During the above-noted telephone interview, the Examiner indicated that she will review Drobny in Application No. 10/577,619, and will initial a Form PTO-1449 upon resubmission by Applicants. Accordingly, Applicants are submitting a Form PTO-1449 listing Drobny in the same manner as listed by the Examiner in the '619 application. As pointed out during the interview, only pages 8 and 9, as compared to pages 8-9 and 60-63 as listed by the Examiner, are available to Applicants in the Image File Wrapper.

Moreover, the Examiner has once again crossed through two U.S. applications on the Form PTO-1449, indicating that the documents are not publications to be listed on the face of the issued patent. Thus, while these U.S. applications have clearly been considered by the Examiner, the Examiner has crossed through the documents as not being publications.

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In contrast to the Examiner's assertions, U.S. applications are properly cited on a Form PTO-1449 in accordance with 37 C.F.R. 1.98. Thus, it is appropriate for these citations to appear on the face of the issued patent.

Therefore, the Examiner is requested to initial the Form PTO-1449 submitted herewith and to include an initialed copy with the next communication from the Patent and Trademark Office.

Authorization is hereby provided to charge any fee necessary for consideration to Deposit Account No. 19-0089.

#### **Response To Rejection Under 35 U.S.C. 112, Second Paragraph**

In response to the rejection of claims 1-22 under 35 U.S.C. 112, second paragraph, as being indefinite, Applicants submit the following.

The rejection once again questions as to which surface the homopolymers, copolymers and terpolymers are coupled. In response, Applicants note that claim 1 explicitly recites that the at least one of radiation-chemically and plasma-chemically modified polytetrafluoroethylene powder includes a surface, and that the homopolymers, copolymers or terpolymers are radically coupled on the surface. Accordingly, this is to once again confirm that the homopolymers, copolymers or terpolymers are radically coupled on the surface of the polytetrafluoroethylene powder surface.

During the above-noted interview, the Examiner recommended that claim 1 be amended to even more explicitly recite this claimed subject matter, and by the amendment herein claim 1 has been amended as suggested by the Examiner. Accordingly, this ground of rejection should be withdrawn.

The rejection once again questions the “radiation-chemically” and “plasma-chemically” terminology. In response, Applicants submit that one having ordinary skill in the art would readily understand the scope and content of the claimed subject matter, especially in view of Applicants’ specification and the knowledge of one having ordinary skill in the art, such as U.S. Patent No. 6, 770,378 which is of record, and Lunkwitz et al., Journal of Fluorine Chemistry, 125 (2004) 863 – 873, a copy of which is submitted herewith.<sup>1</sup>

As once again discussed with the Examiner during the above-noted telephone interview, as disclosed on pages 2 and 6 of Applicants’ specification, various functional groups/reactants can be used, and these can be reactants such as recited in Applicants’ claim 13.

For example, as disclosed at page 2 of Applicants’ specification:

By means of the effect of high-energy radiation with an absorbed dose of approximately 100 kGy, a pourable fine powder is obtained from the fibrous-felted polymers as a result of the partial decomposition of the polymer chains. This powder still contains loose agglomerates that can be easily separated into primary particles with a particle diameter of <5  $\mu\text{m}$ . In the case of irradiation in the presence of reactants, functional groups are formed into the polymer. If the irradiation occurs in air, then according to Eq. (9.22) (and subsequent hydrolysis of the --COF groups by means of moisture in the air), carboxyl groups result. If, before irradiation,  $(\text{NH}_4)_2\text{SO}_3$  is mixed in, then groups containing S are to be attained. These functional groups reduce the hydrophobia and organophobia of the PTFE so substantially that the resulting fine powder can be easily homogenized with other media. The positive characteristics of PTFE, such as its excellent gliding, separating, and dry lubrication characteristics as well as its high chemical and thermal stability, are maintained. Carboxyl and sulfonic acid groups to which perfluorized chains are connected also have a high degree of chemical inertness. . . .

Thus, one having ordinary skill in the art would readily understand that the surface of the polytetrafluoroethylene can be chemically modified by radiation and/or plasma treatment.

Moreover, depending upon reactants present during the radiation and/or plasma treatment, the

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<sup>1</sup> Applicants note that in accordance with MPEP 609.05(c), this document is submitted as evidence directed to an issue of patentability raised in the Office Action so that the requirements of 37 C.F.R. 1.97 and 1.98 need not be satisfied for consideration of the information.

surface will include different functional groups. For example, if oxygen is present, the perfluoroalkyl-(peroxy) radical centers will be expected to be present.

Thus, the PTFE powder can be modified radiation-chemically, for example, by means of electron irradiation or gamma irradiation. As is known, the polymer chains are thereby broken down and persistent (long-lived) reactive perfluoroalkyl(peroxy) radical centers are formed. Such persistent (long-lived) reactive perfluoroalkyl(peroxy) radical centers are also formed when the PTFE powders are modified and broken down by means of a plasma.

In the event that oxygen is present during the radiation-chemical or plasma-chemical modification, persistent (long-lived) reactive perfluoroalkyl(peroxy) radical centers are formed. However, one skilled in the art is aware of this as disclosed in Applicants' specification, such as at the above-noted portion on page 2 of the specification.

In the event that other reactants (besides oxygen) are present, in addition to persistent (long-lived) reactive perfluoroalkyl (peroxy)radical centers, functional groups are also formed during the radiation-chemical or plasma-chemical modification, which functional groups can have an additional positive influence on the coupling reactions in that these functional groups change the interaction behavior or wetting behavior in the reaction system. However, as disclosed, the homopolymers, copolymers or terpolymers would be radically coupled to the surface of the PTFE powder particles.

During the above-noted interview, the Examiner indicated that it will be acceptable to maintain the language in the claims, and to include in the response that radiation-chemically modified polytetrafluoroethylene powder is polytetrafluoroethylene powder that has been chemically modified by radiation, and that plasma-chemically modified polytetrafluoroethylene powder is polytetrafluoroethylene powder that has been chemically modified by plasma.

By the amendment herein, claims 1, 5, 7-9, 13, 17, 19 and 22 have been amended as suggested by the Examiner in the Office Action and during the above-noted telephone interview. Regarding these amendments, the terminology of at least one has been changed to use "or" language as compared to "and" language. However, this is to make it clear, as discussed with the Examiner during the above-noted telephone interview, that "at least one of A and B" and "at least one of A or B" language are each intended to denote that A and B can be presently separately as well as in combination.

In view of the above, the 35 U.S.C. 112, second paragraph, rejection should be withdrawn. However, if the Examiner deems that any amendment of the claims would be beneficial, the Examiner is requested to contact the undersigned by telephone to discuss the same.

#### **Response to Art Based Rejections**

The following rejections are set forth in the Office Action.

(a) Claims 1-7 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 4,385,130 to Molinski.

(b) Claims 1-7 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,040,370 to Wozny et al. (hereinafter "Wozny").

(c) Claims 1-7 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,576,106 to Kerbow et al. (hereinafter "Kerbow").

(d) Claims 1-7 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,824,872 to Coates et al. (hereinafter "Coates").

The rejections essentially contend that while the claims set forth that the polytetrafluoroethylene (PTFE) powder is radiation-chemically modified or plasma-chemically modified and that the polymers are bonded via reaction in dispersion or solid, the claims read on a PTFE polymeric powder having polymers radically bonded to the surface produced by a different method. The rejections contend that the burden has shifted to Applicants to establish that the product produced in the prior art is different from the product recited in Applicants' claims.

In response, Applicants submit the following.

According to Applicants' claimed subject matter, radiation-chemically or plasma-chemically modified PTFE powders are used as base powders, and it is these base powders that include radicals on the surfaces, and it is to these radicals that the homopolymers, copolymers or terpolymers are coupled. This modified PTFE powder is thus used as a base material that is then reactively converted in dispersion or in solid together with polymerizable, olefinically unsaturated monomers, whereby the radically coupled PTFE polymer powders are produced.

In contrast, according to Molinski, unmodified PTFE powder with monomers (styrene and maleic anhydride) is present as the base product suspended in chlorobenzene, which is available in excess. This suspension is treated with gamma rays, and graft copolymers are obtained on the PTFE. This in-situ graft copolymerization of PTFE products with monomers is sufficiently known from the prior art.

The rejection relies upon Molinski apparently for its disclosure in Examples 6-8. In these examples, styrene and maleic anhydride were graft copolymerized by the Example 1 method but using FLUON as powder. Thus, it appears that 100 grams of FLUON were suspended in monochlorobenzene (300 ml), containing also 10.0 g (0.096 moles) of styrene and 9.4 g (0.096

moles) of maleic anhydride, in a reaction vessel fitted with stirring means, heating means, gas inlet and outlet ports and condensing means. The suspension was subjected to gamma radiation. Before and during the gamma radiation a stream of nitrogen gas was bubbled through the contents of the vessel. The contents of the vessel were heated to 52.5°C under continuous agitation and subjected to gamma radiation for a total of 4.5 hrs at a dose rate of 250 krad/hr. The radiated mixture received the total dose of 1125 krad, after which the radiation, heating and stirring ceased. The grafted resin powder was quantitatively transferred to a washing column and washed free from unreacted monomers, solvent and unwanted byproducts. Finally the resin was converted into the acid form and dried in vacuum oven at 60°C.

The rejection does not establish that this process produces a product sufficiently close to that recited in the Applicants' claims so as to shift any burden to Applicants to establish a difference thereover. Accordingly, if this ground of rejection is maintained, the Examiner is requested to specifically establish where Molinski discloses a product that would be close to that recited in Applicants' claims, especially the claims as amended herein.

Wozny discloses a fluorocarbon polymer dispersion converted with monomers in the presence of a peroxide initiator. Applicants submit that it is not known from the technical or patent literature that PTFE is activated by peroxides or by radicals formed therefrom. In the technical and patent literature, PTFE is modified and activated by plasma treatment and radiation treatment, see for, example U.S. Patent No. 6,770,378, which is already of record, or K. Lunkwitz et al., Journal of Fluorine Chemistry, 125 (2004) 863 – 873, a copy of which is submitted herewith.

According to Wozny, core shell polymer systems are described in which the PTFE forms the core and the polymer formed in the process is present by being deposited but not grafted, i.e.



not radically coupled, on the PTFE surface and thus forms a so-called casing or “shell” without a chemical bond to the PTFE. This is additionally substantiated by the fact that, e.g., the molar weight was determined from the SAN formed in Example 45, which is possible only after the separation from the PTFE. According to Wozny, a SAN copolymer shell is polymerized on the PTFE particle surface without chemical coupling to the PTFE. A free flowing core shell powder of PTFE and SAN is thus produced which can be then incorporated into ABS in a compatible manner.

According to this method, the SAN copolymer deposited on the PTFE particle surface can be easily separated from the PTFE without residue by solvents such as, e.g., NN dimethylacetamide, so that the two components can be easily separated and eliminated as highly purified materials, since in contrast to the PTFE polymer product according to Applicants’ claims, no chemical coupling with the PTFE is achieved, nor was it attempted.

Analogously, after the compounding of the PTFE SAN core shell system in ABS in examples 47 – 50, the PTFE can easily be separated as a highly purified material from the blend system, whereby the products as a blend can also be easily and clearly distinguished from the PTFE polymer powders according to the invention.

Another indication that only a core shell system without the coupling of core and shell was produced and intended in Wozny, is evident from column 18, lines 28 – 36 through the designation of SAN/PTFE and the text passage “The PTFE containing additive .. a co-coagulated blend of styrene-acrylonitrile resin...”

Accordingly, this ground of rejection should be withdrawn.

Kerbow does not appear to disclose perfluoropolymer, such as PTFE. In the examples of Kerbow, the fluoropolymer ETFE together with monomer (MAN... maleic anhydride) was used

in the in-situ radiation grafting. Grafted ETFE-gMAN products are obtained, which consequently represent different products than recited in Applicants' claims.

Moreover, because the MAN of Kerbow cannot be homopolymerized, only one MAN monomer per radical point can be coupled. In the present invention, homopolymers, copolymers or terpolymers are present on the PTFE particle surface, and therefore at least two monomers or more are chemically coupled as a grafted polymer chain.

It is also clearly described in Kerbow, column 4, lines 21 – 22, that the irradiation of the fluoropolymer powder is carried out in the presence of the substance to be grafted – but radiation-chemically or plasma-chemically modified PTFE powder is not used., an different product would appear to be obtained.

Accordingly, this ground of rejection should be withdrawn.

According to Coates, fluoropolymer powders with macromolecules are surface treated such that the macromolecules are immobilized on the powder surface, i.e., are rendered immobile by crosslinking the precipitated macromolecule, but without achieving or even wanting to achieve a chemical coupling or bond. Analogously to Wozny, core shell systems are obtained in which the material of the casing or shell is physically deposited on the surface of the core and is not connected to the core by a chemical coupling. If a shearing is exerted on this deposited shell, e.g., during the production of a dispersion or during compounding, the shell can be easily separated from the core in the event of damage, which is shown by Table 4 of Coates. In contrast, because the PTFE polymer powder according to the present invention includes polymer chains chemically radically coupled to the PTFE powder via covalent bonds, they cannot be separated during mechanical stress.

The cross-linking/initiation of the branching of the macromolecules of the casing or shell on the fluoropolymer powder core can be carried out in Coates by atmospheric plasma treatment. Furthermore, methods for cross linking the deposited macromolecules of the casing or the shell on the particle surface of the core are listed in Coates at column 3, lines 11 – 16. As noted above, the physical properties of this physically deposited cross linked casing or shell are meager or poor.

Accordingly, this ground of rejection should be withdrawn.

Thus, it does not appear that any of Molinski, Wozny, Kerbow and Coates discloses a radically coupled polytetrafluoroethylene polymer powder as recited by Applicants, and the rejections of record should be withdrawn.

#### **Response to Double Patenting Rejections**

The following nonstatutory obviousness-double patenting rejections are set forth in the Office Action.

(a) Claims 1-22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-26 of copending Application No. 10/577,300.

(b) Claims 1-22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-20 of copending Application No. 10/577,619.

Initially, Applicants note that a Final Office Action has been mailed on November 16, 2009 in Application No. 10/577,619, and the Examiner is requested to consider this Final Office Action when reviewing the present rejections.

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Applicants submit that the rejections are without appropriate basis in that the rejections do not take into consideration the total recitations set forth in the claims of the applications. For example, in Application No. 10/577,300 various couplings via functional groups and reaction mechanisms are recited; however, the rejection does not indicate why it would have been obvious to have arrived at the presently claimed subject matter from the claims of Application No. 10/577,300.

Similarly, the rejection based upon the claims of Application No. 10/577,619, improperly does not provide an indication as to how the claims of Application No. 10/577,619 are being modified to arrive at the subject matter recited in the present application.

Accordingly, for at least the reasons set forth above, the rejections of record should be withdrawn. However, if these are the only remaining rejections, the Examiner is requested to contact the undersigned regarding the possibility of filing a Terminal Disclaimer.

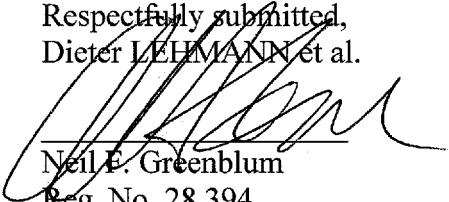
**CONCLUSION**

In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections of record, and allow each of the pending claims.

Applicants therefore respectfully request that an early indication of allowance of the application be indicated by the mailing of the Notices of Allowance and Allowability.

Should the Examiner have any questions regarding this application, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,  
Dieter LEHMANN et al.



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